PATENT

Atty. Docket Number: EM/3239

THE COMMISSIONER OF PATENTS AND TRADEMARKS
Washington, D.C. 20231

Transmitted herewith for filing under *35 USC 111* and *37 CFR 1.53* is the ☐ Design ☒ Utility patent application of:

Inventor: Ching-Shen HORNG

Entitled: POSITIONING DEVICE FOR A SENSOR ELEMENT OF A MINIATURE FAN

Enclosed are:

- ☒ 6 page(s) of written description, claims and abstract.
- ☒ 3 sheet(s) of drawings.
- ☐ An assignment of the invention to
- ☒ Executed declaration of the inventor(s).
- ☐ A certified copy of a ________________ application. Priority is claimed if not already of record.
- ☒ A verified statement to establish small entity status under *37 CFR 1.9* and *37 CFR 1.27*.
- ☐ Preliminary amendment.
- ☐

The filing fee has been calculated as shown below:

ITEM AS FILED		# EXTRA	SMALL ENTITY	FULL FEE
Basic Fee			☒ Utility .... $395. ☐ Design .... $165.	☐ Utility .... $790. ☐ Design .... $330.
Total Claims	4 - 20 =	[1]	× $ 11 =	× $ 22 =
Independent Claims	1 - 3 =	[2]	× $ 41 =	× $ 82 =
☐ Multiple Dependent Claims in Proper Form Presented			+ $135 =	+ $270 =
		TOTAL	$395.00	

[1] If less than 20 filed, enter 0. [2] If less than 3 filed, enter 0.

☐ Please charge my **Deposit Account Number 02-0200** in the amount of $________ to cover the filing fee (and assignment recording fee, if any). A duplicate copy of this paper is enclosed.

☒ A check in the amount of $395.00 to cover the filing fee (and assignment recording fee, if any) is enclosed.

☒ The Commissioner is hereby authorized to charge any additional fees associated with this communication, including patent application filing fees and processing fees under *37 CFR 1.16* and *37 CFR 1.17* or credit any overpayment to **Deposit Account Number 02-0200**. A duplicate copy of this paper is enclosed.

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Date: 21 October 1997

Respectfully submitted,

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Positioning Device for a Sensor Element of a Miniature Fan

Background of the Invention

1. Field of the Invention

The present invention relates to a positioning device for a sensor element of a miniature fan.

2. Description of the Related Art

A wide variety of miniature fans have been provided. For example, U.S. Patent No. 5,492,458 discloses an electric fan including a housing having a hub formed in the center, a shaft having one end force-fitted in the hub and having an annular flange formed in the other end, two polar plates force-fitted on the shaft, and a stator disposed between the polar plates. Nevertheless, the starting effect of the motor of such an electric fan is not satisfactory as a sensor element on the circuit board for starting cannot be accurately aligned with an end edge of the polar plates. The present invention is intended to provide a positioning device for the sensor element which mitigates and/or obviates the above problems.

Summary of the Invention

It is a primary object of the present invention to provide a positioning device which can align the sensor element on the circuit board accurately with an end edge of the polar plates.

Another object of the present invention to provide a positioning device a sensor element of a miniature fan in which the motor of a miniature fan to be easily activated.

A positioning device for a miniature fan in accordance with the present invention comprises a coil seat which, in turn, includes an axle tube, an upper polar plate assembly, a lower polar plate assembly, and a winding mounted between the upper polar plate assembly and the lower polar plate assembly. A circuit board is mounted to the axle tube and includes a sensor element for activating a rotor. The sensor element is located on a vertical line extending from an end edge of the lower polar plate assembly along a direction parallel to a longitudinal axis of the axle tube.

The coil seat includes a first mark formed thereon, and the sensor element includes a second mark formed thereon to be aligned with the first mark to assure that the sensor element is located on the vertical line. In an alternative embodiment of the invention, the circuit board includes a third mark to be aligned with the first mark and the second mark to assure that the sensor element is located on the vertical line.

Other objects, advantages, and novel features of the invention will become more apparent from the following detailed description when taken in conjunction with the accompanying drawings.

Brief Description of the Drawings

Fig. 1 is an exploded perspective view of a positioning device for miniature fans in accordance with the present invention;

Fig. 2 is a schematic side view of the positioning device in accordance with the present invention;

Fig. 3 is an exploded perspective view of a second embodiment of the positioning device in accordance with the present invention;

Fig. 4 is an exploded perspective view illustrating a third embodiment of the positioning device in accordance with the present invention; and

Fig. 5 is a schematic side view of the third embodiment of the positioning device.

Description of the Preferred Embodiments

Referring to the drawings and initially to Figs. 1 and 2, a positioning device for a sensor element of miniature fans in accordance with the present invention generally includes a coil seat 1 and a circuit board 2. The coil seat 1 includes an axle tube 14 having an upper polar plate assembly 11, a lower polar plate assembly 12, and a winding 13 mounted between the upper and lower polar plate assemblies 11 and 12. A first mark 15 is provided at the lower polar plate assembly 12 in a manner that a front end edge 121 of the lower polar plate assembly 12 locates on a vertical line which resides in an area of the first mark 15, i.e., the first mark 15 contains a vertical line V which is perpendicular to a radial line R (formed from a center of the coil seat

1 to the front end edge 121) and extended vertically from the front end edge 121 in a direction parallel to a longitudinal axis of the coil seat 1. The circuit board 2 includes a central opening 22 through which the axle tube 14 extends. The circuit board 2 further includes a plurality of electric elements 21 for controlling and a sensor element 23. The sensor element 23 includes a corresponding second mark 24. In assembly, the first mark 15 of the coil seat 1 and the second mark 24 of the sensor element 23 are aligned with each other (Fig. 2) to assure alignment of the sensor element 23 and the front end edge 121 of the lower polar plate assembly 12. The first mark 15 and the second mark 24 may be lines, dots, etc. By such an arrangement, the sensor element 23 on the circuit board 2 is accurately aligned with the front end edge 121 of the lower polar plate assembly 12, thereby providing a reliable starting of a rotor of the motor (not shown), which is conventional and therefore not further described.

Fig. 3 illustrates a second embodiment of the positioning device in which the circuit board 2 has a notch 25 defined therein for mounting the sensor element 23. In addition, a number of pin holes 26 are defined in the circuit board 2 adjacent to the notch 25 for receiving the pins (not shown) of the sensor element 23, which is conventional and therefore not further described. The lower polar plate assembly 12 includes a first mark 15 adjacent to the front end edge 121, the sensor element 23 has a second mark 24 formed thereon, and the circuit board 2 includes a third mark 27 adjacent to the notch 25. The first, second and third marks 15, 24 and 27 may be lines, dots, etc. In assembly, the third mark 27 provides a reference for aligning with the second mark 24 and the first mark 15 such that the sensor element 23 is in alignment with the front end edge 121 of the lower polar plate assembly 12, thereby providing a reliable activation of the rotor of the motor.

Figs. 4 and 5 illustrate a third embodiment of the invention, in which the first mark 15 is provided at the rear end edge 122 of the lower polar plate assembly 12, which locates on the vertical line residing in the area of the first mark 15. The other arrangement of the third embodiment is identical to that of the first embodiment and is therefore not redundantly described.

Conclusively, the sensor element 23 is located on a vertical line extending from

the front end edge 121 or the rear end edge 122 of the lower polar plate assembly 12 along a direction parallel to a longitudinal axis of the axle tube 14 such that the rotor may be reliably activated to rotate.

Although the invention has been explained in relation to its preferred embodiments, it is to be understood that many other possible modifications and variations can be made without departing from the spirit and scope of the invention as hereinafter claimed.

What is claimed is:

1. A positioning device for a miniature fan, comprising:

a coil seat including an axle tube, an upper polar plate assembly, a lower polar plate assembly, and a winding mounted between the upper polar plate assembly and the lower polar plate assembly, the lower polar plate assembly including an end edge, and

a circuit board mounted to the axle tube and including a sensor element adapted to activate a rotor, the sensor element being located on a vertical line extending from the end edge of the lower polar plate assembly along a direction parallel to a longitudinal axis of the axle tube.

2. The positioning device according to claim 1, wherein the coil seat has a first mark formed thereon, and the sensor element has a second mark formed thereon to be aligned with the first mark means so as to assure that the sensor element is located on the vertical line.

3. The positioning device according to claim 1, wherein the circuit board includes a notch defined therein for receiving the sensor element.

4. The positioning device according to claim 2, wherein the circuit board includes a third mark to be aligned with the first mark and the second mark to assure that the sensor element is located on the vertical line.

Abstract of the Disclosure

A positioning device for a miniature fan includes a coil seat having an axle tube, an upper polar plate assembly, a lower polar plate assembly, and a winding mounted between the upper polar plate assembly and the lower polar plate assembly. A circuit board is mounted to the axle tube and includes a sensor element for activating a rotor. The sensor element is located on a vertical line extending from an end edge of the lower polar plate assembly along a direction parallel to a longitudinal axis of the axle tube.

ATTORNEY/DOCKET NO:

DECLARATION FOR PATENT APPLICATION AND APPOINTMENT OF ATTORNEY

As a below named inventor, I hereby declare that my residence, post office address and citizenship are as stated below next to my name; I believe that I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention (Design, if applicable) entitled:

Positioning Device for a Sensor Element of a Miniature Fan

the specification of which (check one):

☒ is attached hereto.

☐ was filed on: as Application Serial No.:
and (if applicable) was amended on:

☐ was filed on: as International Application (PCT) No.:
and (if applicable) was amended on:

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment(s) referred to above. I acknowledge the duty to disclose information which is material to patentability as defined in *Title 37, Code of Federal Regulations, §1.56*. I hereby claim foreign priority benefits under *Title 35, United States Code §119* of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed.

PRIOR FOREIGN APPLICATION(S)			*PRIORITY CLAIMED*	
Number	*Country*	*Day/Month/Year Filed*	*Yes*	*No*
86216105	Taiwan, Republic of China	20/09/1997		X

I hereby claim the benefit under *Title 35, United States Code, §120* of any United States application(s) or PCT international application(s) designating The United States of America listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in that/those prior application(s) in the manner provided by the first paragraph of *Title 35, United States Code, §112*, I acknowledge the duty to disclose information which is material to patentability as defined in *Title 37, Code of Federal Regulations, §1.56* which became available between the filing date of the prior application(s) and the national or PCT international filing date of this application:

Application Number	*Filing Date*	*Status - Patented, Pending or Abandoned*

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under *section 1001 of title 18 of the United States Code* and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

POWER OF ATTORNEY: I (We) hereby appoint as my (our) attorneys, with full powers of substitution and revocation, to prosecute this application and transact all business in the Patent and Trademark Office connected therewith: J. Ernest Kenney, Reg. No. 19,179; Eugene Mar, Reg. No. 25,893; Richard E. Fichter, Reg. No. 26,382; Charles R. Wolfe, Jr., Reg. No. 28,680; Thomas J. Moore, Reg. No. 28,974; David E. Dougherty, Reg. No. 19,576; Bruce H. Troxell, Reg. No. 26,592, and
I(we) authorize my(our) attorneys to accept and follow instructions from FIVE CONTINENTS INTERNATIONAL PTO _____ regarding any matter related to the preparation, examination, grant and maintenance of this application, any continuation, continuation-in-part or divisional based thereon, and any patent resulting therefrom, until I(we) or my(our) assigns withdraw this authorization in writing.

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No. 3, Lane 45, Yi-Yung Road, Kaohsiung, Taiwan, R.O.C.	
DATE October 9, 1997	*SIGNATURE*

VERIFIED STATEMENT (DECLARATION) BY AN INDEPENDENT INVENTOR CLAIMING SMALL ENTITY STATUS UNDER *37 CFR 1.9(F) AND 1.27(b)*

APPLICANT OR PATENTEE: Ching-Shen HORNG
SERIAL OR PATENT NUMBER:
FILED OR ISSUED:
TITLE: Positioning Device for a Sensor Element of a Miniature Fan

DOCKET #:
GROUP ART UNIT:
EXAMINER:

As a below named inventor, I hereby declare that I qualify as an independent inventor as defined in *37 CFR 1.9(c)* for purposes of paying reduced fees to the Patent and Trademark Office with regard to the matter described in:

- ☒ The specification filed herewith, with the title as listed above.
- ☐ The patent application identified above.
- ☐ The PCT international patent application identified above.
- ☐ The patent number identified above.

I have not assigned, granted, conveyed or licensed and am under no obligation under contract or law to assign, grant, convey or license any rights in the invention to any person who could not be classified as an independent inventor under *37 CFR 1.9(c)* if that person had made the invention, or to any concern which would not qualify as a small business concern under *37 CFR 1.9(d)* or a nonprofit organization under *37 CFR 1.9(e)*.

Each person, concern or organization to which I have assigned, granted, conveyed or licensed or am under an obligation under contract or law to assign, grant, convey or license any rights in the invention is listed below:

- ☒ no such person, concern or organization.
- ☐ each such person, concern or organization listed below. **Note:** Separate verified statements are required from each named person, concern or organization having rights to the invention averring to their status as small entities *(37 CFR 1.27)*.

FULL NAME ADDRESS	☐ Individual ☐ Small Business Concern ☐ Nonprofit Organization

FULL NAME ADDRESS	☐ Individual ☐ Small Business Concern ☐ Nonprofit Organization

☐ See attached sheet for additional person(s), concern(s) or organization(s).

I acknowledge the duty to file, in this application or patent, notification of any change in status resulting in loss of entitlement to small entity status prior to paying, or at the time of paying, the earliest of the issue fee or any maintenance fee due after the date on which status as a small entity is no longer appropriate (*37 CFR 1.28(b)*).

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine, or imprisonment, or both, under *section 1001 of Title 18 of the United States Code*, and that such willful false statements may jeopardize the validity of the application, any patent issuing thereon, or any patent to which the verified statement is directed.

	Inventor 1	*Inventor 2*	*Inventor 3*
Name	Ching-Shen HORNG		
Date	October 9, 1997		
Signature			

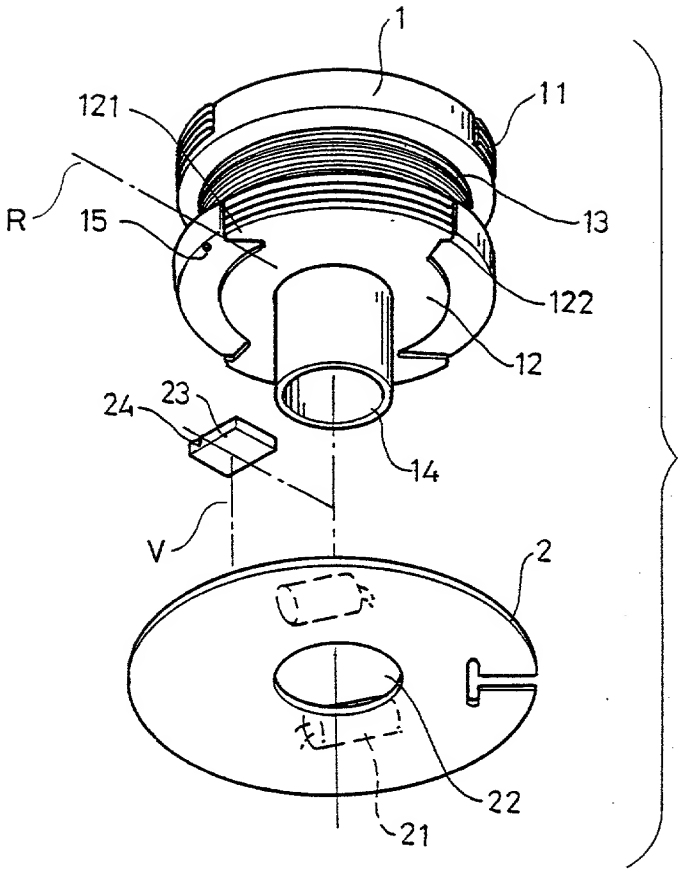

FIG. 1

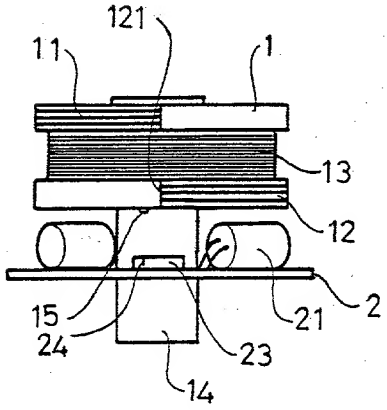

FIG. 2

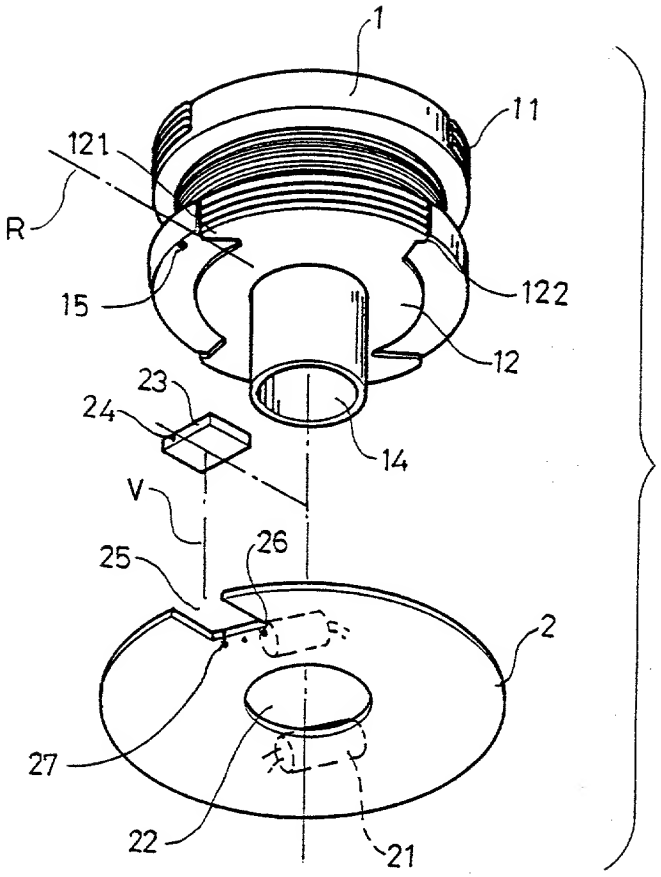

FIG. 3

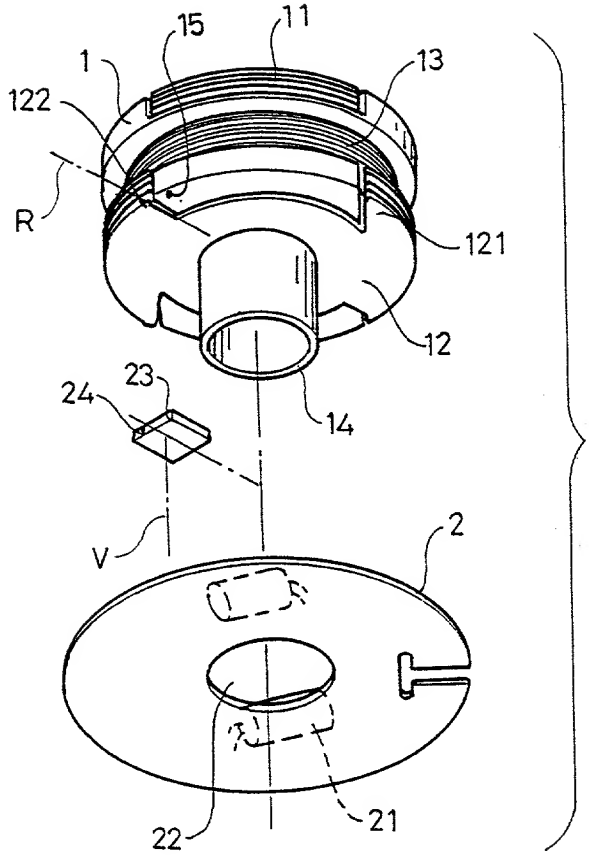

FIG.4

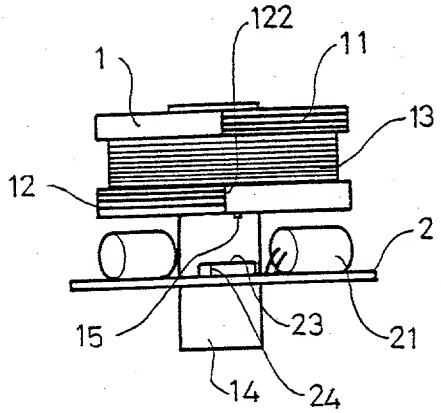

FIG.5